

### Trend Study 2-2-01

Study site name: Mouth of Blacksmith Fork.

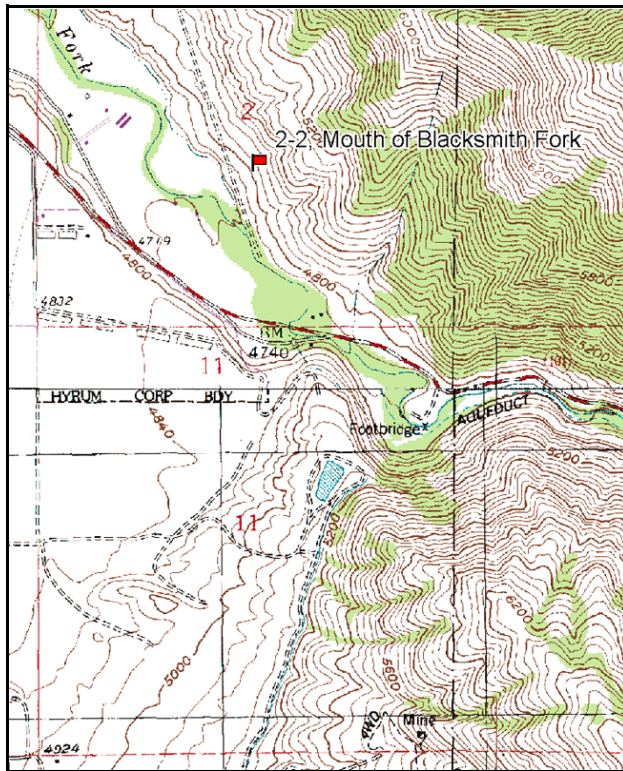
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 159 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 4 on 5 ft.

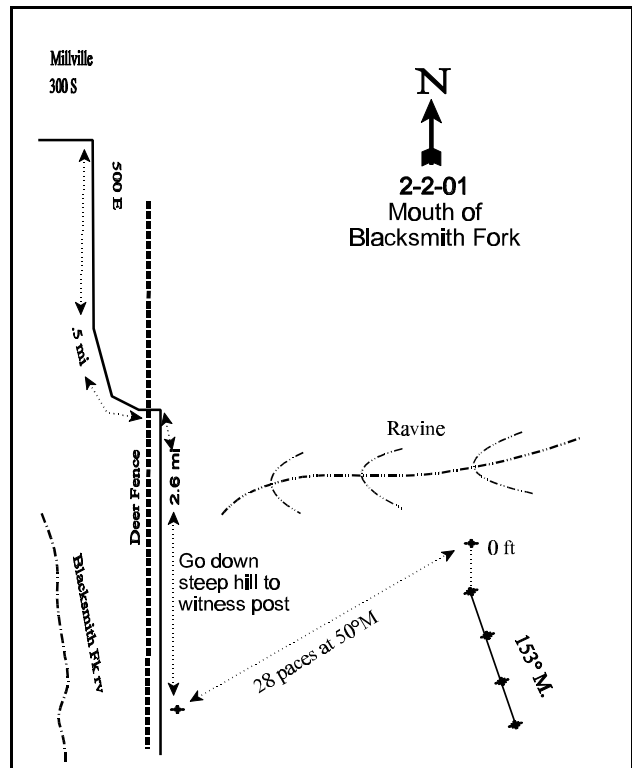
### LOCATION DESCRIPTION

Proceed south 0.5 miles from the intersection of 300 South and 500 East in Millville. At the intersection just east of the deer fence, proceed south for 2.6 miles and stop at a witness post, which is at the top of the hill. From the witness post, walk 100 feet at 50 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #90. The baseline runs at a bearing of 159 degrees magnetic. The baseline doglegs after 100 feet and runs 151 degrees magnetic.



Map Name: Logan

Township 10N, Range 1E, Section 2



Diagrammatic Sketch

UTM 4609060 N, 433136 E

## DISCUSSION

### Trend Study No. 2-2

The Mouth of Blacksmith Fork study is located slightly north of where the Blacksmith Fork river enters the Cache Valley. The site is located on a moderately steep (30%), west to southwest facing slope. Elevation is approximately 4,880 feet. The transect sits on a narrow bench about 200 feet above a big game fence which runs along the east edge of the valley. The vegetation type is basin big sagebrush with a remnant stand of perennial grass and an overabundance of annual grasses, annual forbs, and perennial weeds. The area has been heavily utilized in the past. Currently ('01), deer and elk pellet groups occur infrequently. A pellet group transect read at the site in 2001 estimated only 2 deer days use/acre (5 ddu/ha). Most of this critical winter range area has been almost totally depleted of browse within the last 30 to 40 years. A majority of this depletion is due to poor seedling establishment caused by competition with a very thick "carpet" of winter annuals. This is especially difficult for seedling establishment with extended periods of drought.

Soil is classified as "Sterling gravelly loam," a category with moderately rapid permeability. Rooting depth can reach 60 inches, but more often is restricted to the upper 16 inches of the soil profile. The soil is moderately alkaline and calcareous in the upper horizons, but becomes strongly so in the subsoil. Erosion potential is medium to high (Erickson and Mortensen, 1974). Soils at the site have a loam texture and a moderately alkaline pH (7.9). Effective rooting depth (see methods) is estimated at 16 inches. Rocks are common on the surface and throughout the profile. Phosphorus is limiting in the soil at only 7.3 ppm. Values less than 10 ppm may be limiting to plant growth and development. Soil temperature is extremely high averaging nearly 76° F at a depth of almost 17 inches. Currently ('01), erosion is not a problem due to the abundance of herbaceous vegetation and litter cover. The composition of the herbaceous understory is poor, with cheatgrass, Japanese brome, and rattlesnake brome contributing 66% of the grass cover. The abundance of these grasses leaves the area susceptible to a devastating fire which would eliminate the sagebrush.

Big sagebrush and broom snakeweed are the only browse species remaining on the site. Some mountain big sagebrush grows on the nearby slopes, but the majority of the sagebrush along the bench is the more deeply rooted basin big sagebrush. The population was extremely decadent (92%), heavily browsed (100%), and generally in poor vigor during the 1984 reading. Dead and dying plants resulting from heavy browsing and rodent activity were abundant. In 1990, the population increased slightly to 966 plants/acre. Use was more moderate and percent decadency went down to 31%. Vigor was still poor on 24% of the population. In 1996, a much larger sample size estimated a population of 1,680 plants/acre. Because the population is characteristically clumped and discontinuous in its distribution, the larger sample gives a better estimate of its true density. Utilization was light, vigor good, and percent decadency decreased to only 8%. Recruitment also improved in 1996 with good numbers of seedlings and young plants (13% and 26% of the population respectively). Density remained stable in 2001. Use is still mostly light, vigor good, and percent decadence low. However, recruitment is poor due in part to the abundant herbaceous understory dominated by annuals.

Shrubs such as antelope bitterbrush and Utah juniper occur occasionally, but were not sampled even with the larger sample. Broom snakeweed appears to have a stable population. It contributes <1% of the browse cover.

Herbaceous composition is dominated by annual grasses and biennial and perennial weeds. Among the grasses, the annuals cheatgrass and jointed goatgrass (*Aegilops cylindrica*) are especially prevalent. Annual grasses produced 94% of the grass cover in 1996 and 78% in 2001. Less abundant are bluebunch wheatgrass, Sandberg bluegrass, prairie Junegrass, and red three-awn, a warm season increaser. The poor value bulbous bluegrass is also abundant and has increased significantly in 2001.

The forb component consists largely of annual mustards, ragweed, storksbill, and yellow salsify. Ragweed alone made up 58% of the forb cover in 1996. Apart from the small amounts of white sweet clover and alfalfa, the forb composition is nearly valueless and indicative of very poor range condition.

#### 1984 APPARENT TREND ASSESSMENT

This site appears to be in a state of decline. Virtually every indicator suggests a continuing decline in range condition. This is especially evident with respect to vegetative parameters. The soil trend will likely continue to remain stable as long as abundant vegetation cover continues. Perhaps the most serious downward trend is the possible loss or serious depletion of the big sagebrush resource due to extremely heavy use combined with poor recruitment.

#### 1990 TREND ASSESSMENT

Basin big sagebrush has shown a slight increase in its density (17%) since 1984. Percent decadency has gone from 92% down to 31%, while the young class currently makes up 31% of the population. This population remains a moderately hedged, low density sagebrush community. The herbaceous trend is down. Undesirable species are prominent and continue to increase. Dyers woad increased significantly in nested frequency. Other species that have increased in abundance include jointed goatgrass and cheatgrass. Actually, only 6 out of 20 forbs increased in nested and quadrat frequency value, with 4 of these being weedy increasers. There is some evidence of soil movement, but ground cover percentages indicate no meaningful changes in the soil condition.

##### TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - downward and dominated by annuals (1)

#### 1996 TREND ASSESSMENT

Soil trend is up due to an increase in litter cover and a decline in percent bare ground from 13% to <1%. The abundant herbaceous vegetation and its associated litter adequately protect the soil from erosion. Trend for browse is up with a 43% increase in density of basin big sagebrush. Some of the increase is due to the much larger sample size used in 1996. However, utilization is light, vigor good, and percent decadency low at 8%. Much of the dead sagebrush within the population appear to be the result of the harsh winters of the early 1980's (heavy use and winter injury) combined with extended drought. Sum of nested frequency for perennial grasses has decreased, while that for forbs has slightly increased. However, forbs only make up 17% of the total herbaceous cover. Trend for the perennial species within the herbaceous understory is down. The herbaceous composition is extremely poor, with >88% of the herbaceous cover made up of annual weeds. The grass composition is totally dominated by undesirable species which include joint goatgrass, rattlesnake brome, Japanese brome, cheatgrass, annual rye, and bulbous bluegrass. Preferred perennial grasses make up only 4% of the grass cover. The forb composition is also poor and dominated by weedy annual, biannual, and perennial species. Common ragweed is the most abundant species. It accounts for 58% of the forb cover, and showed a notable increase in its nested frequency since 1990. Conversely, dyers woad declined significantly in nested frequency, while that of white sweetclover increased. With the high amounts of fine fuel (weedy species), one wildfire could remove all of the critical winter browse (basin big sagebrush) from the site.

### TREND ASSESSMENT

soil - up (5)

browse - up (5)

herbaceous understory - down with poor composition (1)

### 2001 TREND ASSESSMENT

The soil trend remains stable with abundant herbaceous vegetation and litter cover. Trend for basin big sagebrush is also stable with a similar population density. Use is mostly light, vigor normal, and percent decadence low at 13%. The only downward trend parameter is the decline in young and seedling sagebrush. Trend for the herbaceous understory is down slightly. Sum of nested frequency of perennial grasses has increased since 1996; however, the rise is the result of the significant increase in the poor value bulbous bluegrass. Jointed goatgrass and cheatgrass also increased significantly. These 3 species account for 89% of the grass cover and 74% of the total herbaceous cover. Sum of nested frequency of perennial forbs declined in frequency. The most abundant forbs consist of pale alyssum, ragweed, and storksbill. The only positive aspect of the forb composition is the significant decline in the nested frequency of dyers woad and the stable frequency of alfalfa.

### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down slightly, dominated by annual grasses and weedy forbs (2)

### HERBACEOUS TRENDS --

Herd unit 02 , Study no: 2

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	<i>Aegilops cylindrica</i> (a)	<sub>a</sub> 3	<sub>b</sub> 81	<sub>c</sub> 148	<sub>d</sub> 229	1	26	54	75	7.88	15.26
G	<i>Agropyron spicatum</i>	<sub>b</sub> 46	<sub>a</sub> 15	<sub>a</sub> 21	<sub>a</sub> 17	19	7	9	7	.73	.28
G	<i>Aristida purpurea</i>	3	-	-	-	1	-	-	-	-	-
G	<i>Bromus brizaeformis</i> (a)	-	-	48	45	-	-	19	19	.19	.18
G	<i>Bromus japonicus</i> (a)	-	-	<sub>b</sub> 338	<sub>a</sub> 73	-	-	95	29	16.71	.32
G	<i>Bromus tectorum</i> (a)	-	-	<sub>a</sub> 262	<sub>b</sub> 313	-	-	74	94	8.07	14.82
G	<i>Carex</i> spp.	-	-	-	4	-	-	-	1	-	.38
G	<i>Elymus cinereus</i>	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 8	-	-	-	5	-	.27
G	<i>Koeleria cristata</i>	5	-	-	-	4	-	-	-	-	-
G	<i>Poa bulbosa</i>	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 58	<sub>c</sub> 171	-	-	22	58	1.49	7.62
G	<i>Poa pratensis</i>	-	-	-	3	-	-	-	1	-	.03
G	<i>Poa secunda</i>	<sub>a</sub> 12	<sub>ab</sub> 34	<sub>a</sub> 14	<sub>b</sub> 62	6	16	7	24	.03	.78
G	<i>Secale cereale</i> (a)	<sub>a</sub> -	<sub>a</sub> 8	<sub>c</sub> 114	<sub>b</sub> 89	-	3	44	36	2.77	2.48
Total for Annual Grasses		3	89	910	749	1	29	286	253	35.64	33.08
Total for Perennial Grasses		66	49	93	265	30	23	38	96	2.25	9.36
Total for Grasses		69	138	1003	1014	31	52	324	349	37.90	42.44
F	<i>Agoseris glauca</i>	1	5	3	-	1	2	1	-	.00	-

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Allium acuminatum	<sub>b</sub> 22	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	12	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	<sub>a</sub> 47	<sub>b</sub> 106	-	-	18	42	.21	.33
F	Ambrosia psilostachya	<sub>c</sub> 261	<sub>ab</sub> 94	<sub>b</sub> 114	<sub>a</sub> 57	85	41	49	27	3.92	2.25
F	Artemisia ludoviciana	1	3	-	-	1	1	-	-	-	-
F	Asclepias asperula	<sub>a</sub> -	<sub>b</sub> 8	<sub>ab</sub> 5	<sub>b</sub> 11	-	5	4	6	.54	.23
F	Astragalus utahensis	<sub>ab</sub> 6	<sub>b</sub> 8	<sub>a</sub> -	<sub>a</sub> -	4	5	-	-	-	-
F	Balsamorhiza sagittata	1	-	-	-	1	-	-	-	-	-
F	Calochortus nuttallii	1	-	3	3	1	-	2	2	.01	.03
F	Cirsium undulatum	<sub>b</sub> 22	<sub>a</sub> 1	<sub>a</sub> 1	<sub>a</sub> 2	9	1	1	1	.00	.15
F	Comandra pallida	3	-	-	-	2	-	-	-	-	-
F	Crepis acuminata	5	7	-	2	3	3	-	1	-	.00
F	Epilobium brachycarpum (a)	-	-	<sub>b</sub> 70	<sub>a</sub> 6	-	-	33	2	.29	.01
F	Erodium cicutarium (a)	-	-	<sub>a</sub> 8	<sub>b</sub> 141	-	-	4	46	.07	4.19
F	Gilia spp. (a)	-	-	3	8	-	-	1	3	.00	.01
F	Grindelia squarrosa	-	-	3	-	-	-	1	-	.03	-
F	Holosteum umbellatum (a)	-	-	<sub>a</sub> -	<sub>b</sub> 101	-	-	-	39	-	.29
F	Isatis tinctoria	<sub>a</sub> 1	<sub>c</sub> 46	<sub>b</sub> 27	<sub>ab</sub> 6	1	24	12	3	.19	.01
F	Lactuca serriola	-	6	2	6	-	4	1	4	.00	.02
F	Linum lewisii	1	-	-	-	1	-	-	-	-	-
F	Lithospermum ruderae	<sub>a</sub> -	<sub>b</sub> 6	<sub>a</sub> -	<sub>a</sub> -	-	5	-	-	.03	-
F	Lomatium grayi	5	-	-	-	3	-	-	-	-	-
F	Melilotus alba	<sub>a</sub> 9	<sub>a</sub> 1	<sub>b</sub> 28	<sub>a</sub> -	4	1	11	-	.30	-
F	Medicago sativa	15	19	16	22	6	9	7	11	.45	.74
F	Petradoria pumila	2	-	-	-	1	-	-	-	-	-
F	Phlox longifolia	-	-	5	-	-	-	2	-	.01	-
F	Ranunculus testiculatus (a)	-	-	-	6	-	-	-	3	-	.01
F	Tragopogon dubius	<sub>c</sub> 191	<sub>ab</sub> 35	<sub>b</sub> 60	<sub>a</sub> 8	86	15	28	4	.71	.16
F	Zigadenus paniculatus	-	-	-	4	-	-	-	1	-	.00
Total for Annual Forbs		0	0	128	368	0	0	56	135	0.57	4.86
Total for Perennial Forbs		547	239	267	121	221	116	119	60	6.22	3.63
Total for Forbs		547	239	395	489	221	116	175	195	6.80	8.50

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --  
Herd unit 02 , Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata tridentata	50	52	9.85	10.98
B	Gutierrezia sarothrae	7	9	.03	.69
Total for Browse		57	61	9.89	11.67

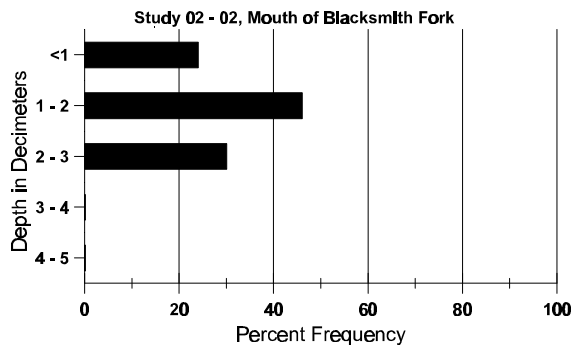
BASIC COVER --  
Herd unit 02 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	398	390	2.00	11.00	59.50	69.97
Rock	195	101	16.00	20.75	6.88	3.52
Pavement	119	163	14.00	3.50	2.87	4.34
Litter	400	387	58.00	51.75	71.15	55.77
Cryptogams	-	-	1.00	0	0	0
Bare Ground	62	27	9.00	13.00	.41	.26

SOIL ANALYSIS DATA --  
Herd Unit 02, Study no: 02, Mouth of Blacksmith Fork

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.9	75.6 (16.5)	7.9	33.3	40.7	26.0	2.7	7.3	188.8	.8

## Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre	Days Use per Acre (ha)
			'01	'01
Elk	1	-	-	-
Deer	1	2	26	2 (5)
Cattle	1	1	17	1 (3)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 2

Artemisia tridentata tridentata																	
A Y G R E	Form Class (No. of Plants)	Vigor Class								Plants Per Acre	Average (inches)		Total				
		1	2	3	4	5	6	7	8		9	1		2	3	4	Ht.
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	10	-	-	1	-	-	-	-	-	11	-	-	-	220		11
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	8	1	-	-	-	-	-	-	-	9	-	-	-	300		9
	96	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66	32 40	2
	90	9	1	-	1	-	-	-	-	-	8	-	3	-	366	25 27	11
	96	52	3	-	-	-	-	-	-	-	55	-	-	-	1100	32 52	55
	01	67	13	-	-	-	-	-	-	-	80	-	-	-	1600	31 41	80
D	84	-	-	22	-	-	-	-	-	-	16	3	3	-	733		22
	90	3	5	1	-	-	-	-	-	-	5	-	3	1	300		9
	96	5	2	-	-	-	-	-	-	-	6	-	-	1	140		7
	01	10	2	-	-	-	-	-	-	-	7	-	1	4	240		12
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	520		26
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>								<u>%Change</u>			
'84		00%		100%		13%								+17%			
'90		24%		03%		24%								+43%			
'96		06%		00%		01%								+10%			
'01		16%		00%		05%											
Total Plants/Acre (excluding Dead & Seedlings)												'84	799	Dec:	92%		
												'90	966		31%		
												'96	1680		8%		
												'01	1860		13%		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia sarothrae																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	1	-	-	-	-	-	-	-	2	-	-	-	66	19	22	
	90	24	-	-	1	-	-	-	-	-	25	-	-	-	833	18	16	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	14	19	
	01	27	1	-	-	-	-	-	-	-	27	1	-	-	560	12	18	
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		67%			00%			00%			+89%							
'90		00%			00%			00%			-31%							
'96		00%			00%			00%			-10%							
'01		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	33%			
												'90	899		0%			
												'96	620		0%			
												'01	560		0%			
Opuntia spp.																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33	6	8	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'84		00%			00%			00%										
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	0		-			
												'01	0		-			